First Release of the IPHAS Catalogue of Extended Planetary Nebulae

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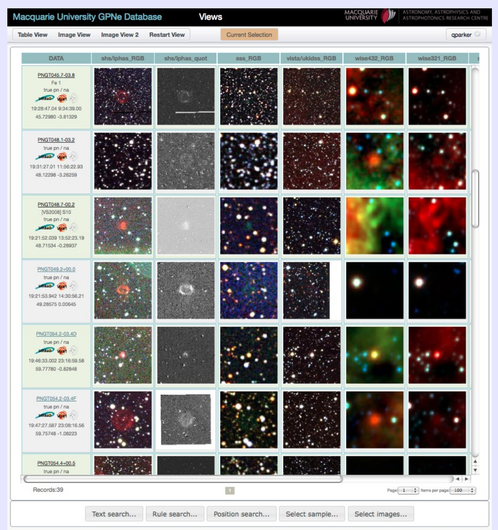
INTRODUCTION & METHOD

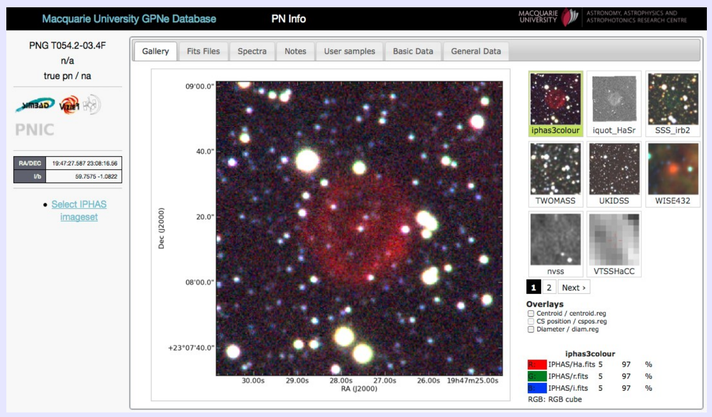
In order to obtain an accurate census of the Planetary Nebulae (PNe) population in the Galaxy it is necessary to include the faintest and more evolved objects (as well as those located towards the Galactic Anticentre). These groups are often poorly represented mainly due to a "detection problem" mostly in zones of heavy extinction. The new generation of surveys such as the Macquarie-AAO Strasbourg H-alpha Survey (MASH : Parker et al. 2005, Miszalski et al. 2008) in the Southern Hemisphere and the INT Photometric H-alpha Survey (IPHAS: Drew et al. 2005; González-Solares et al. 2008) in the Northern Galactic Plane aim at overcoming this issue.

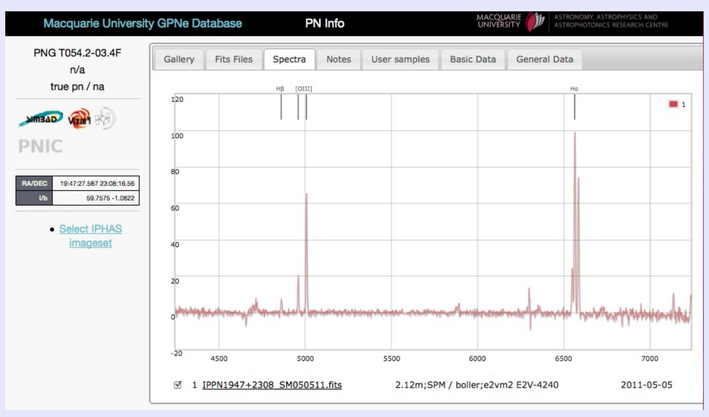
We present the first results of an extensive search for new Extended Planetary Nebulae conducted with IPHAS. The scrupulous search, which was performed by visually checking 2 squared degrees Hα-r mosaics, led to the detection of hundreds of PN candidates in the right ascension range RA=18h to RA=07h. The subsequent follow-up spectroscopy of a large set of objects was realised with various telescopes worldwide: from 1.9m (Radcliffe telescope, SAAO) to 10m (GTC) using either longslit or integral field spectroscopy. The identification of the nebulae was done with the updated diagnostic diagrams by Frew et al. (2010) and Sabin et al. (2013). We note that among our sample we also found new symbiotic stars (Corradi et al. 2008, 2010) as well as new supernova remnants (Sabin et al. 2013).

Our search allowed us to spectroscopically identify **176 new PNe and we nearly double the number of known PNe in this part of the Plane.** The data are compiled in our new catalogue.

The new IPHAS PNe in the online Macquarie Catalogue.

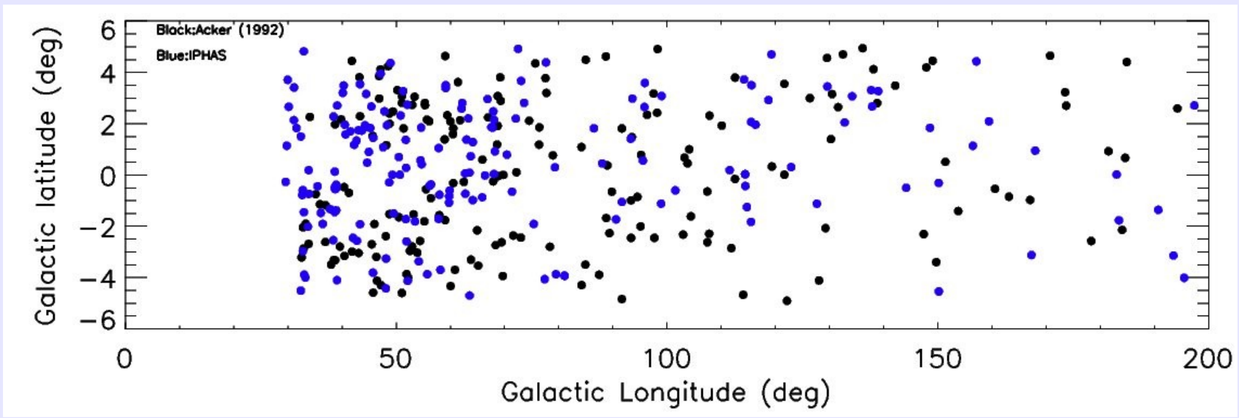


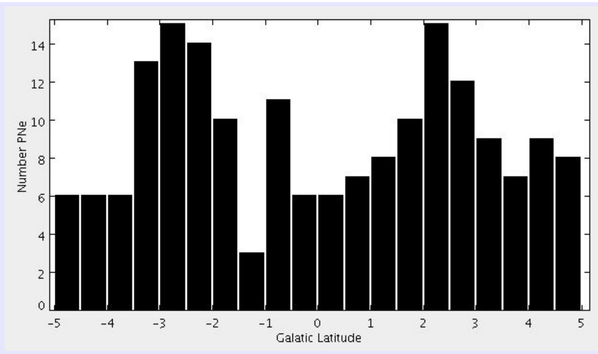


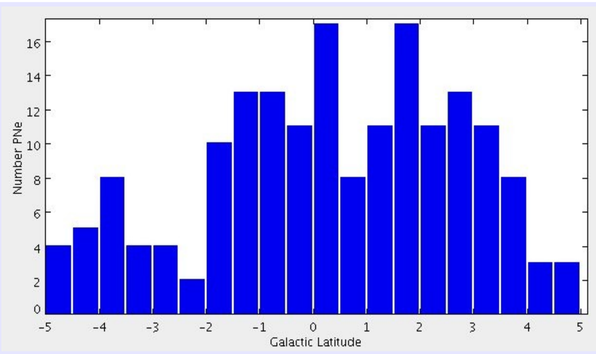


1-Left: Example of IPHAS "True" PNe as they appear in the online Macquarie PN database. Right:: Multi-wavelength images of IPHASX J194727.6+230818 (Top) with its associated spectrum (Bottom)

BASIC STATISTICS







2- Galactic distribution of the new IPHAS PNe compared to the findings by Acker et al (1992).

Morphology	Elliptical	Round	Bipolar	Irregular	Asymmetric	Quasi-Stellar
Total Number	35	40	40	39	2	19
% Fraction	20	23	23	22	1	11

3- Morphological repartition of the IPHAS PNe based on the ERBIAS classification.

THE IPHAS CATALOGUE

The catalogue (and the search method) will be presented in a forthcoming paper and it can be also viewed in the online new **"Macquarie PN Database"** by Parker et al. (see APN6 Talk, 2013). For consistency between the diverse PNe catalogues, we decided to adopt common entries:

***Flags*:** True "T", Likely "L" and Probable "P" as for MASH PNe.
***IAU designation*:** Based on the galactic coordinates and set to fit the general galactic PN nomenclature i.e. PN Glll.l+b.b
IPHAS designation: All the newly discovered objects with IPHAS are named according to the International Astronomical Union convention: IPHASX JHHMMSS.s+DDMMSS (exclusively used for extended sources).
J2000 equatorial coordinates RA,DEC: The coordinates were defined based on the geometry (see below) of the objects.
Galactic coordinates l,b: They are based on the RA,DEC defined previously.
Semi major and semi minor axis: The measurement of the PNe sizes was done using the 120s exposure Hα+[NII] images so we are limited in description of the exact extent of the nebulae.
Morphological classification: We adopt the 'ERBIAS' classifier to indicate the Elliptical , Round, Bipolar, Irregular, Asymmetric or quasi-Stellar (point source) PNe. The sub-classifier 'amprs' indicates one sided enhancement/asymmetry 'a', multiple shells or external structure 'm', point symmetry 'p', well defined ring structure or annulus 'r' or resolved internal structure 's'

CONCLUSIONS

We present **176 new Planetary Nebulae discovered in the framework of the IPHAS survey** among which we identified 111 True, 20 Likely and 45 Possible PNe. These nebulae offer a new view of the Galactic Plane particularly at low latitudes (near b=0 deg) and an additional coverage in the Galactic Anticenter region. Most of the main morphological classes are nearly equally represented; and although we mainly deal with extended PNe we also uncovered during our investigation 19 (quasi) Stellar PNe. The data will be available in the online " **Macquarie PN Database"** which will also gather all the MASH & DSH discoveries. All these new findings will definitely bring new insights in the PN field.

References: Acker A.et al. ,1992,Strasbourg - ESO catalogue of galactic planetary nebulae; Corradi R. L. M. et al., 2008, A&A, 480, 409; Corradi R. L.M. Et al., 2010, A&A, 509, A41+; Drew J. E., et al. 2005, MNRAS, 362, 753; Frew D. J., Parker Q. A., 2010, PASA, 27, 129; Gonzàlez-Solares E. A.et al., 2008, MNRAS, 388, 89; Miszalski B. et al.,, 2008, MNRAS, 384, 525; Parker Q. A. et al., 2005, MNRAS, 362, 689; Sabin L., et al., 2013, MNRAS, 431, 279.

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